XVIII.—*On the Indian Species of the Genus* Erinaceus.—*By* J. Anderson, M. D., *Supdt. Indian Museum, and Professor of Comparative Anatomy, Medical College.*

(Read 4th December, 1878.)

(With Plates III, IV, V and Va.)

Dr. Jerdon* recognized only two species of Indian Hedgehog, *viz.*, *Erinaceus collaris*, Gray, and *Erinaceus micropus*, Blyth, distinguishing the former as the North Indian and the latter as the South Indian hedgehog. But besides these, the following supposed species had either been described or indicated as belonging to the Indian and Himalayan fauna, before the publication of Jerdon's work. They were as follows, according to priority, *viz.*, *E. spatangus*, Bennett,† *E. grayi*, Bennett‡ *E. mentalis*, Gray§ (not described) and finally *E. nudiventris*, Horsfield.‖ The two first of these were stated by Bennett to be from the Himalayas, while Gray recorded *E. mentalis* from India, and Horsfield *E. nudiventris* from Madras.

Dr. Jerdon doubtfully considered *E. grayi* as identical with *E. collaris*, and *E. spatangus* as the young of *E. grayi*, but he did not pass any opinion on the undescribed *E. mentalis*. In 1841, Wagner described a hedgehog under the name of *E. albiventris*,¶ and considered it as probably of Indian origin. On the strength of this opinion Jerdon was disposed to regard it as possibly *E. micropus*. Dr. Peters, however, very kindly arranged with the authorities of the Museum at Munich that the type of *E. albiventer* should be sent to him for comparison with a specimen forwarded to him by me, and which I then believed to be *E. micropus*, but which now proves to be a nearly allied species named by Stoliczka *E. pictus*.** This latter species, however, is so closely allied to *E. micropus*, in the structure of its feet, that the comparison instituted between its feet and those of *E. albiventer*, conclusively proves that the latter is a perfectly distinct form from both, as it only possesses 4 toes in the hind feet, whereas *E. micropus* and *E. pictus*, like all the other Indian species of hedgehogs, have 5 toes in the hind feet. Dr. Peters is of the opinion that *E. albiventer*, is probably the young of *E. heterodactylus*, Sundvl. from Africa.

* Mammals of India, 1867, p. 62.
† Proc. Zool. Soc. Lond. 1832, p. 123.
‡ l. c. p. 124.
§ List. Mamm. B. M. 1851, p. 81.
‖ Cat. Mamm. East. Ind. Co. Mus. 1851, p. 136.
¶ Schreber, Säugeth. Vol. (Supp.) 11, 1841, p. 22.
** Stoliczka, Journ. As. Soc. Beng., Vol. XLI, 1872, p. 223.

From the facts to be hereafter stated there can be no doubt but that these two species, *E. micropus* and *E. pictus* are perfectly distinct from each other, and from any other species of Indian hedgehog ever described.

It would also appear from what I have stated under *E. grayi*, that it is a well-defined species, and that it is probably the hedgehog which was figured by Gray from the Doab as *E. collaris*, but which was never described, and also that Dr. Jerdon was correct in regarding *E. spatangus* as the young of *E. grayi*, the latter term being the one that should be accepted for the species.

Dr. Gunther, to whom I am indebted for comparing the hedgehogs in the British Museum with certain specimens forwarded from the Indian Museum, informed me that the true relations of *E. mentalis* cannot be properly determined. I regret, however, that having mislaid Dr. Gunther's notes, I am unable to give the details of his comparisons.

I have personally examined the type of *E. nudiventris* which is a very young example of *E. micropus*.

Besides these three species, *E. micropus*, *E. pictus*, and *E. grayi*, the materials which have passed under my observation* have yielded two other apparently distinct species of hedgehog from Western India, and which I propose to name respectively *E. jerdoni*, and *E. blanfordi*, the distinctive characters of which are indicated hereafter. We have thus five species of hedgehog in India, three of which are forms which were unknown when Fitzinger† published his compilation on the *Erinaceidæ* in which he recognized *E. grayi*, *E. collaris*, *E. spatangus*, *E. mentalis*, *E. nudiventris* and *E. micropus*, referring them all to a trivial sub-genus *Hemiechinus*.

The hedgehogs of India are referable to two distinct groups, based on the characters of the dentition. *E. micropus* and *E. pictus* resemble each other in the following dental detail, wherein they differ from the other Indian hedgehogs, but whether any of the African forms are like them in this respect I am unable to say. The character I refer to is this, that the second upper premolar has a simple crown and only one fang, whereas *E. grayi*, *E. jerdoni*, *E. blanfordi*, *E. macracanthus*, *E. niger*,‡ *E. megalotis*, *E. auritus*, *E. albubus*, and *E. europæus*, have the same tooth large with a compound crown and with 3 fangs. In both the species, the second upper premolar is very small and somewhat external to the line of the other teeth. In *E. pictus*, the tooth would appear to be generally present throughout life, and it is larger than in *E. micropus*, in which it seems to be generally lost at an early age. In hedgehogs with a compound second premolar, the tooth is

* I am specially indebted to Mr. W. T. Blanford for his having placed his fine series of Indian hedgehogs, preserved in alcohol, at my disposal for examination.

† Sitzgsber. Ak. Wiss. Wien. LVI. 1867, pp. 844, 890.

‡ For description of this species see following pages (p. 212).

always in the line of the other teeth and always large and is never prematurely shed.

The first premolar also of the lower jaw is relatively smaller than in the species just enumerated, and it is smaller in *E. micropus* than in *E. pictus*.

There is a remarkable circumstance connected with *E. micropus*. In examining the different species of Indian hedgehogs, I was in the habit of having their skulls removed and cleaned for examination, and in having this done with *E. micropus* I was always disappointed on receiving back the skulls from the osteologist to find what I supposed was a broken zygomatic arch, owing to careless manipulation. The Museum osteologist, however, persisting in asserting that he was most careful in preparing the skulls, and that he had not injured them, I had a careful dissection made from without inwards on to the zygomatic arch, and I was astonished to find that there was no trace of a malar bone in any specimens of *E. micropus* examined by me, 4 in all. This fresh dissection showed that the interval between the zygomatic process of the squamous and the malar process of the maxillary is bridged over by tendon, and that therefore this South Indian hedgehog stands alone in this remarkable feature. Such a variation on the normal structure of the skull of a hedgehog was not to be anticipated, as there is no weakening of the zygomatic arch in any of the other species. Even in the allied species *E. pictus*, the malar is strongly developed. An examination of the free ends of the process of the maxillæ and squamous shews that this observation is perfectly accurate, as there is no indication whatever of any specialized surface on which a malar could rest, and which is always easily observable in skulls of other species in which the malar has been lost.

Notwithstanding this anomalous character, I am disposed to attach more weight to the character of the second upper premolar in this species than to the absence of its malar, which is an intense specific variation, whereas the other which is common to two species very closely allied in other details of their structure would seem to be almost entitled to sub-generic rank.

These two forms, *E. micropus* and *E. pictus*, notwithstanding the foregoing difference in the skulls, are externally so alike that they might be mistaken for one another. Not only is their coloration almost identical, but the form of their heads is much the same; and more important, their fore feet more especially differ essentially in shape from the fore feet of all the other Asiatic species of hedgehogs (see figs. *e* and *f*, Pl. III, and compare with fig. *f*, Pl. IV). Both of these species are characterized by their feet being short, club-shaped, and tubercular on the soles, whereas in such forms as *E. grayi* and the other Asiatic hedgehogs, the feet are not club-

shaped and tubercular, but moderately elongated with well-developed toes and generally long claws.

The feet of hedgehogs would appear to be the subject of considerable variation, as some have only 4 toes on the hind feet, (*Peröechinus* Fitzinger), and moreover the central pad of the hind feet would appear to be rudimentary in some species and to be present in others, while, as has just been shown, some of them have tubercular soles. It appears to me therefore that reliable specific characters are to be observed in the feet of the members of this genus, but I do not consider any of the variations to be of sub-generic value. As an illustration of the differences that subsist in this respect, it will be observed that the species *E. grayi* does not possess any true central pad on the hind foot, a structure which is largely developed in *E. jerdoni*, but nearly absent in *E. blanfordi*, which, as was to be expected from this circumstance, is closely allied to *E. grayi*.

Another feature in the structure of Indian hedgehogs is deserving of attention, and that is the presence on the vertex, in some species, of a considerable nude area quite devoid of spines, and even of the most rudimentary hairs. This naked area reaches forwards to where the spines arise on the forehead, dividing those on this region into two sets, one on either side of the head. It occurs in all the Indian species with the exception of *E. grayi* and *E. blanfordi*, and it is present also in *E. niger* and *E. macracanthus*, whereas it does not appear to exist in the European hedgehog and I have not observed it in any of the following species, *viz.*, *E. auritus*, *E. albulus*, and *E. megalotis*, all of which, however, like the Indian species, whether with or without this area, agree in having fine soft almost silky hair, very distinct from the long bristly hair that clothes the body of the European species.

In the Zoology of Persia* a small hedgehog is figured along with the type of *E. macracanthus*. Both of the specimens which yielded the figures are now in the Indian Museum and the latter is distinguished (*E. macracanthus*,) by this nude area and black spines with two white rings, and the former, which Blanford considered as a young specimen of the species, by the entire absence of the bare area and by yellowish spines of which the tips are white, followed by a narrow black ring succeeded by a white and this again by a short brown space. This small hedgehog in the character of its spines and in the absence of the bare area on the vertex resembles *E. megalotis*, but it does not appear to be that species. I am disposed to conclude that this bare area is of too great structural importance to be present or absent among members of a species and to consider it as of specific significance. With regard to the disposition of the spines it would appear that

* Zool. of Persia, Blanford, 1876, Pl. 1.

their relative positions to each other depend greatly on the condition of the *panniculus carnosus*, and that the spines only become irregularly intermixed through contractions of this muscle which, when relaxed, permits the spines to lie flat and regularly.

On the label of an example of *E. albulus*, collected by Stoliczka, he has written, "outer edge of nostrils ciliated." On looking at the nostril in all the Indian species of hedgehog, I find that the outer edge, more especially the upper crescentic half, is provided with a papillary valve which serves to close the orifice. In *E. grayi*, it forms a distinct fringe of 12 papillæ.

The spines of the Indian and Western Asiatic hedgehogs are grooved and ridged, the ridges being covered with fine tubercles. The numbers of the ridges on the spines of the same animal are subject to considerable variation, and the degree to which the tubercles are developed appears to vary, so that stable specific characters are not yielded by these structures.

The foregoing characters, therefore, permit of the Indian hedgehogs being resolved into the following groups, and of the species being recognized by the characters under which they are grouped.

A. Second upper premolar simple, one-fanged.

a. Feet club-shaped, soles tubercular.

I. A division or bare area on the vertex.

No malar bone: a prominent dark brown band through the eyes on to the neck. A white frontal band. Spines orange with apices white, succeeded by a narrow dark brown band. Ears moderate. Fur below white, limbs brown, ... *E. micropus.*

A perfect malar bone: a brown band through the eyes and only very rarely prolonged on to the neck, stopping at the angle of the mouth. Spines broadly white at apex, succeeding brown band rather pale: no orange tint on spines. Ears round and not large, but larger than in the preceding species. Limbs pale brown, under-surface white, ... *E. pictus.*

B. Second upper premolar compound, three-fanged.

b. Feet well developed and broad.

II. No division or bare area on the vertex.

No large mesial pad on the hind foot. Head elongated and muzzle long. Ears large, high and pointed. General colour dark brown,..... *E. grayi.*

Mesial pad on the hind foot very feeble. Head short, muzzle not elongated. Ears moderately large, not high and not pointed. General colour black above, fuliginous-brown below, ... *E. blanfordi.*

III. A division on the vertex, separating the spines into two groups. Hind foot with a large prominent mesial pad. Muzzle moderately long. Ears large, rounded at the tip and broad at the base. Spines long with 2 white and 3 black bands in the adult. General colour black above and below, ... *E. jerdoni.*

The following is a description of these species in detail:

ERINACEUS MICROPUS. Plate V[4].

Erinaceus auritus, Pearson, Journ. As. Soc. Bengal, Vol. V, 1836, p. 191.

Erinaceus collaris, Gray. List. Mam. B. M. 1843, p. 81, *partim.*

Erinaceus micropus, Blyth, Journal Asiatic Soc. Bengal, Vol. XV, 1846, p. 170, *partim*; *id. op. cit.* Vol. XXII, 1853, p. 582; *id.* Cat. Mam. Mus. As. Soc. Bengal, 1863, p. 80: Wagner, Schreber, Säugeth, Suppl. V, 1855, p. 591; Stoliczka, Journal Asiatic Soc. Bengal, Vol. XLI, 1872, p. 225.

Erinaceus nudiventris, Horsfield, Cat. Mam. East Ind. As. Mus., 1851, p. 136.

Erinaceus (Hemiechinus) micropus, Fitzinger, Sitzungbte. der K. Akad. Wissensch. Wien, Vol. LX, Pl. 1, 1867, p. 875, *partim.*

Head rather short, and broader than *E. pictus*, and slightly concave from the forehead to the tip of the snout. Ears moderately large and rounded at the tip, directed forwards and outwards, and slightly smaller than the ears of *E. pictus*. Feet well developed, but small, short and broad, with short toes and short claws: feet being somewhat larger than those of *E. pictus*. The first toe of the hind foot small, but claw strong. The soles of the hind feet more or less tubercular. When the muscle is not contracted over the forehead, the spines do not reach anterior to the front margin of the ears. There is a broad bare space passing backwards from the forehead for about one inch and a quarter, with a nearly uniform breadth of half an inch, and this bare area would appear to exist in both sexes of the species. The tail is short, and there is a semicircular bare area above it. The ears are moderately but sparingly clad with short whitish hairs, and the tail with longish dark brown hairs. The anterior third of the head, up to half way between the nose, the eye, and the chin appear to be nude, but they are very sparsely covered with minute white hairs. The middle third of the head is covered more profusely with longer hairs, and the posterior third, to between the ears, densely with moderately long hairs, increasing in length from before backwards. The upper surfaces of the feet are well clad with short flattened brown hairs. The bare surfaces on the head and above the tail are perfectly devoid of hairs. The under surface is not very thickly clad and the

insides of the limbs are still less so. The spines are rather fine, about 0·83 of an inch long, very sharp and marked with from 17 to 22 ridges and furrows, the former generally broader than the latter, and covered with minute shining tubercles. The apex of each spine is white and is succeeded by a narrow dark brown band which gives a brown and white speckled appearance to the animal. The remainder of each spine is yellow or orange yellow. The seminude skin of the anterior third of the head is leaden-coloured, a hue that extends on to the chin. The hairs on the second or middle third of the head form a broad brown band which embraces the eye, passes backwards behind the angle of the mouth, over the under surface of the neck as a dark brown collar. A brown spot at the upper angle of the ear. A broad white band behind the brown band and the spines of the forehead, passing downwards before the ears on to the sides of the neck and throat, behind the brown band, and continuous with the white of the under parts; chin and whiskers white, and sides of chin brownish. The lower halves of the limbs clad with brown hairs, also the tail. The inguinal region and lower abdomen clad with brown hairs with an intermixture of white.

The leading features of this species are its short snout and head, short club-shaped feet as compared with *E. grayi*, *E. blanfordi*, and *E. jerdoni*; its slightly longer feet as compared with *E. pictus*, which are, however, of the same type; its not long ears, slightly shorter than in the latter; its white and brown tipped spines, orange or yellow; and a brown collar over the forehead, between the eyes, behind the angle of the mouth and across the throat.

The skull is distinguished by its short broad character, but in this respect it is much narrower than the skull of *E. pictus*. In the former, the breadth across the zygomata falls short considerably of two thirds of the length, whereas in *E. pictus*, breadth and sharpness are marked features of the skull, combined with a greater post-orbital contraction than in *E. micropus*, and, in the adult male, the breadth generally equals two thirds of the length. The complete absence of the malar bone is another character which separates it from *E. pictus*, from which it is also distinguished by the small size of its 2 upper premolars.

The following are some measurements of *E. micropus*.

	♂	♂	♂
Length of body and head, ...	6″·65	6″·05	5″·90
,, of tail, ...	0″·45	0″·53	0″·57
Height of ear,.....	1″·15	1″·05	1″·02
Breadth of ear, ...	0″·80	0″·78	0″·76
Snout to eye, ...	1″·00	0″·94	0″·94
Eye to ear, ...	0″·40	0″·31	0″·38
Length of hind foot without claw, ...	1″·15	1″·13	1″·15
Breadth at 5th toe,.....	0″·36	0″·40	0″·30

Blyth, in 1846,* in treating of the hedgehogs collected by Hutton near the Sutlej, pointed out that the third specimen described by Hutton,† with some doubt, under the name of *E. collaris*, Gray, was apparently distinct from that species. Blyth was disposed to regard it as identical with a hedgehog in the Asiatic Society's Museum, the locality of which he then stated was unknown, but which he afterwards considered‡ to have been received from the Nilgiris from Mr. Smoult and to be the specimen mentioned by Pearson as *E. auritus*. This latter specimen Blyth regarded as specifically identical with hedgehogs sent him from Southern India by Sir Walter Elliot, and with the hedgehog from Southern India in the British Museum grouped by Gray under *E. collaris*. He compared the skull of an adult specimen sent from Southern India by Sir Walter Elliot with the skull of Mr. Smoult's hedgehog and found them exactly to correspond, and these specimens he named *E. micropus*, the last mentioned being the type of the species. The skull, however, of Capt. Hutton's third specimen he goes on to remark "presents some differences; the general form is rather shorter and broader, it is more constricted between the orbits and the zygomæ are considerably more projecting; the small upper premolar anterior to the incisor teeth is less minute; and in the lower jaw, the second lateral pair of incisors from the front are much smaller, as indeed are also the next or last pair of the true incisors." From the description of this specimen which was obtained by Hutton§ in the neighbourhood of Shah Färíd on the left bank of the Sutlej, and from the details regarding the points wherein its skull differs from the skull of the Southern Indian hedgehog, I am disposed to consider, that Hutton's third specimen was an example of *E. pictus*. In 1853‖ Blyth was still doubtful regarding the specific identity of Hutton's third specimen with *E. micropus*.

The next species, the cranial characters of which had been so well indicated by Blyth in 1846 and which entitle it to recognition, was described in 1872 by Stoliczka as *E. pictus*, but no reference was made to Blyth's observations, nor to the cranial and dental features of the animal. The characters selected by Dr. Stoliczka were exclusively external, and were derived from supposed differences existing between its spines and those of *E. micropus*, but after a very careful consideration of a large series of spines of both forms under the microscope, it appears to me that much importance cannot be attached to these structures as guides to species.

* Journ. As. Soc. Bengal, Vol. XV, p. 170; *op. cit.*, Vol. V, 1836, p. 191.
† *op. cit.*, Vol. XIV, p. 351.
‡ *op. cit.*, Vol. XXII, 1853, p. 582.
§ *op. cit.*, Vol. XIV, p. 351.
‖ *op. cit.* Vol. XXII, 1853, p. 582.

Gray in his List of Mammalia* confounded this species with his *E. collaris*, = *E. grayi*.

E. micropus appears to be confined to Southern India, where it occurs in the low lying country and not on the mountains. Col. Beddome informs me that no hedgehog is found on the Nilgiris. The limits, however, of its northern and western distribution have yet to be ascertained.

Erinaceus pictus. Plate III.

? *Erinaceus indicus*, Royle, Ill. Ind. Zool. 1839, p. 6, not described.

Erinaceus collaris? Hutton, Journ. Asiatic Soc. Bengal, Vol. XIV, 1845, p. 351, 3rd specimen, *partim;* Blyth, *l. c.* p. 352, foot note, *id. op. cit.*, Vol. XXII, 1853, p. 582, *partim.*

Erinaceus micropus, Blyth, Journ. Asiatic Soc. Vol. XV, 1846, p. 170, *partim.*

Erinaceus (*Hemiechinus*) *micropus*, Fitzinger, Sitzungsbte. der K. Akad. Wissensch. Wien, Vol. LVI, Pt. 1, 1867, p. 875, *partim.*

Erinaceus (*Hemiechinus*) *pictus*, Stoliczka, Journal Asiatic Soc. Bengal, Vol. XLI, 1872, p. 223.

Head (fig. *d*) the same as in *E. micropus*, but the ears (fig. *g*) somewhat larger, and the feet (*c* to *f*) narrower and not quite so long: the tail (fig. *h*) also is the same as in that species. The spines have the same characters as in *E. micropus*, but their tips are more broadly white and the brown bands below are not so dark. The result is that the latter are nearly obscured by the former. The remaining spines are pale yellowish, nearly white and not orange. There is no continuation of the brown band of the forehead lower than the angle of the mouth, except as a very rare circumstance, and in animals from the region of Central India, where the species probably meets the Southern *E. micropus*, but the colours in all other respects are alike. The dimensions of the species are these:

	♂	♂	♀	♀	♀
Length of head and body, ...	6″·70	6″·00	5″·85	5″·90	4″·73
„ „ tail, ...	0″·68	0″·68	0″·55	0″·53	0″·58
Height of ear, ...	1″·33	1″·23	1″·03	1″·21	0″·85
Breadth of ear, ...	0″·86	0″·88	0″·70	0″·81	0″·61
Snout to eye, ...	0″·88	0″·80	0″·88	0″·95	0″·73
Eye to ear, ...	0″·39	0″·35	0″·30	0″·30	0″·25
Length of hind foot without claw, ...	1″·10	1″·12	1″·10	1″·10	0″·95
Breadth across 5th toe, ...	0″·35	0″·30	0″·25	0″·35	0″·30

The skull (figs. *a* to *c*) is distinguished by its shortness and great zygomatic breadth, in which respects it differs from the skulls of all other Asia-

* List of Mamm. B. M., 1843, p. 81.

tic hedgehogs, and, as already stated, by its one-fanged simple second premolar placed out of the line of the teeth, and by the rather marked post-orbital contraction. The teeth are large and about the same size as in *E. micropus*, only the second premolar of the latter is excessively minute. The other characters wherein it differs from *E. micropus*, have been already indicated under that species.

As already remarked, this form was first described by Hutton as a probable variety of certain hedgehogs which he doubtfully regarded as *E. collaris*, which two of them appear to have been, but this third specimen, however, was undoubtedly *E. pictus*. *E. micropus* has diverged from the ordinary character of the genus more than any other Indian hedgehog, as is evinced by the absence of the malar, and in the excessively rudimentary character of its second premolar, and these modifications occurring in the most southern outlier of a Palæarctic type are noteworthy.

A hedgehog obtained at Guna by Dr. A. Barclay would seem to indicate that the two species may possibly interbreed, as I have experienced some difficulty, judging by external characters only, in saying to which it should be properly referred. The coloration of its spines is more like that of *E. pictus*, than *E. micropus*, as the tips are broadly white, but, unlike any other example of *E. pictus* that has come under my observation, the brown band from the forehead is prolonged beyond the angle of the mouth across the throat. In all other respects, the coloration is alike to that of *E. micropus*. The ears also are somewhat larger than in *E. pictus*. The affinities, however, of this hedgehog as manifested by its teeth and the form of its skull are towards *E. pictus*.

Besides occurring at Gúna, the most southern locality from which I have obtained it, I have received it also from Ulwar, from Major T. Cadell, V. C.; and the Indian Museum also came into the possession of a large number of specimens from Agra through Mr. A. E. Carlleyl. An example from Karachi has been received by exchange with the Municipal Museum, through the valued assistance of Mr. J. A. Murray. This latter specimen agrees with one in Mr. W. T. Blanford's possession from the same locality. He also possesses an adult male from Jeysulmere, the dimensions of which are given in the first column of the foregoing measurements.

It is probable that E. *indicus* was applied by Royle to the hedgehog which occurs about Delhi, and which appears to be this species.

Erinaceus grayi. Plate IV.

Erinaceus collaris, Gray, Ill. Ind. Zool, Vol. I, 1872, Plate VIII, (not described): *id.* List. Mamm. B. M. 1843, p. 81, *partim*: Hutton, Journ. As. Soc. Bengal, Vol. XIV, 1845, p. 351, (first two specimens only);

Blyth, *op. cit.*, Vol. XV, 1846, p. 170 : *id. op. cit.*, Vol. XXII, 1853, p. 582, *partim ;* Wagner, Schreber, Säugeth. Suppl., Vol. V, 1856, p. 590 : Stoliczka, Journ. As. Soc., Vol. XLI, 1872, p. 225.

Erinaceus grayi, Bennett, Proc. Zool. Soc. 1832, p. 124 ; Gray List Mamm. B. M. 1843, p. 81 : Wagner, Schreber, Säugeth., Suppl. Vol. II, 1841, p. 28 ; *id. op. cit.*, Suppl. Vol. V, 1856, p. 590 ; Fitzinger, Sitsungsbte. der K. Akad. Wien, Vol. LVI, Pt. 1, 1867, p. 870, *partim ;* Stoliczka, Journ. As. Soc. Beng, Vol. XLI, 1842, p. 225.

Erinaceus spatangus, Bennett, Proc. Zoo. Soc. 1832, p. 124, *juv ;* Ogilby, Royle's Ill. Ind. Himal. Botany, 1839, p. 62 ; Blyth, Journ. As. Soc. Bengal, Vol. XV, 1846, p. 170 ; Gray, Mamm. B. M,. 1843, p. 82 ; Wagner, Schreber, Säugeth., Suppl. Vol. II, 1841, p. 27 ; *id. op. cit.* Suppl. Vol. V, 1856, p. 590 ; Stoliczka, Journ. As. Soc. Bengal, Vol. XLI, 1872, p. 225.

Hemiechinus grayi, Fitzinger, Sitzungsbte. der K. Akad. Wien, Vol. LVI, Pt. 1, 1867, p. 870.

Hemiechinus collaris, Fitzinger, Sitzungsbte. der K. Akad. Wien, Vol. LVI, Pt. 1, 1867, p. 872.

Hemiechinus spatangus, Fitzinger, Sitzungsbte. der K. Akad. Wien, Vol. LVI, Pt. 1, 1867, p. 873,

Facial portion of head pointed and rather long (fig. *d*). Ears (fig. *g*) large, full, long and somewhat pointed. Feet (figs. *e* and *g*) large, the fore feet rather broad and somewhat truncated, with moderately long toes and powerful claws. The proximal palmar pads forming a pair, and not very prominent. The hind feet with the toes turned inwards, the fingers moderately long and with strong claws. The proximal pad of the sole internal to the first toe, and which is strongly developed as a large mesial pad in *E. jerdoni*, is practically absent in this species, so little is it developed.* The tail (fig. *h*) is moderately long and shortly haired ; no bare space on the vertex. The spines begin slightly behind the anterior margin of the ear, and they are generally about 0″75 long. The longitudinal grooves are numerous and shallow, but broader than the ridges which are 25 to 26 in number and studded with small tubercles. The spines are very narrowly tipped with black, and below this there is a very narrow yellowish band, succeeded by a broad dark-brown, almost black band, the remainder of each spine being yellow, except at its extreme base which is dusky. The broad dark-brown band below the yellow subapical band is so strongly developed, that when the animal is viewed from the side, with the spines directed outwards, it has a black appearance. There is, however, considerable variation in the intensity to which the yellow sub-apical band is developed, and some animals are

* The artist has not well represented this feature on the plate.

therefore much lighter coloured than others, as the brown band succeeding the latter is also much paler in some individuals than in others.

This species, besides the almost entire absence of the proximal mesial pad of the sole, is at once distinguished by the complete absence of the bare space that occurs in E. *pictus*, and E. *micropus*, among the spines of the vertex. From the two last named species which have no large proximal pad on the sole, it is recognised by its large feet, well developed toes, powerful claws, and by the turning in of the hind feet, as well as by its different coloration. There is a considerable naked space over the sacrum, and on the dorsum of the tail as in other species. The snout is seminude, being sparsely covered with very minute hairs. Behind the whiskers, the hairs become much more numerous and longer, and the area below the eye, and the forehead are well clad. The greater part of the front of the ear is nude, but there is a sprinkling of short white hairs internal to and along its margins. The chin and below the lower lips are almost naked, and, immediately behind the chin, the hairs are few. The under parts are well clad, but not densely so, and the limbs are thinly clad, more especially the feet on which the hairs are very few and short. The tail also is only sparsely clothed.

The general colour of the animal is blackish-brown or brown, the spinous portion of the body being darkest; but the colour is variable owing to the reasons already mentioned.

The front of the face from the nose backwards to the spines, the limbs and all the under parts with the exception of the chin and a line from it upwards to the ear which are white, are generally dark-brown or fuliginous-brown, blackish on the face, on which there is occasionally a considerable intermixture of white hairs. The hairs which clothe the ears, and a tuft of hairs at the base of the anterior margin of the ears, are white. The white on the chin is more prolonged upwards to the ears in some specimens than in others, giving rise to a kind of white collar which is much exaggerated in the figure of *E. collaris*. The claws are horny yellow.

The following are the measurements of this species:

	♂	♀	☿
Length of body and head,	6″85	6″70	6″70
,, of tail,	0″96	1″30	1″02
Height of ear,	1″45	1″52	1″38
Breadth of ear,	0″97	0″97	1″00
Snout to eye,	1″00	0″49	0″62
Eye to ear,	0″52	0″49	0″62
Length of hind foot without claw,	1″45	1″45	1″50
Breadth of hind foot,	0″49	0″45	0″38

The skull of this species (figs. *a* to *b*) is distinguished from that of *E. pictus*, and the skull of *E. micropus*, by its large second premolar with three fangs, and from the other two species by its great zygomatic breadth. In this latter respect, it resembles *E. pictus*, but the skull has a considerably longer muzzle than in that species, and, as a whole, is not so broad and round. It is considerably broader than *E. blanfordi*, with more marked post-orbital contraction, and from *E. jerdoni* it is still more markedly separated by its relatively much greater breadth across the zygomatic, and more especially across the base of the muzzle, at the third premolar. The skull is undoubtedly most nearly allied to that of *E. blanfordi*, to which it presents a very close resemblance when the adolescent skull is compared with the adolescent skull of the type of that species. But the latter is narrower across the zygomæ, and has less post-orbital contraction, as already stated. It is further separated from the skull of *E. jerdoni* by its larger teeth, and by the different form of the canine. This tooth in *E. blanfordi*, as well as in this species, is less triangular and more sharply pointed than in *E. jerdoni*, *E. niger*, *E. pictus*, and *E. micropus*, and in this respect differs more in appearance from the first premolar than it does in these last-named species. All of these species are characterized by the presence of two sharp cusps to the canine section of the third premolar, while in *E. niger* described by Blanford, the posterior of these two cusps is entirely absent and its last molar presents only one eminence, while in all the others this tooth has two cusps the inner of which is always the larger.

The figure in the Illustrations of Indian Zoology was copied from one of General Hardwicke's drawings, and on the plate it is stated that the hedgehog was a species found in the Doab. There are many tracts of country in North-Western India named Doab, but General Hardwicke appears from his paper on *Mus giganteus*,* in using the term Doab, to have had in view the country lying between the Jumna and Ganges, in which the military Station of Fatehgarh is situated, and where he appears to have been stationed. There he had drawings made of the species of hedgehog which is there common, also of *Mus giganteus*, and of *M.* (*Nesokia*) *hardwickii* = *Arvicola indica*, Gray.

I am indebted to the late Mr. Andrew Anderson for many living examples of the hedgehog that occurs about Fatehgarh, and which appears to me to agree with the figure of *E. collaris*, from the Doab. As in the figure, the chin of these hedgehogs was more or less white, and, in some, the white extended up towards the ear as a kind of collar which, however, is exaggerated in the drawing of *E. collaris*, in which the contrast between the colours is too marked, and the animal altogether represented too dark. Notwithstand-

* Trans. Journ. Linn. Soc. Vol. VII, 1804, p. 308.

ing, I think there can be but little doubt, that the Fatehgarh hedgehog which is very common in the district is the *E. collaris*, Gray.

The specimens from Madras in the British Museum referred to this species are, as already mentioned, examples of *E. micropus*, Blyth.

This species has been also obtained at Ajmír in Rájpútána by Mr. Blanford, and if I am correct in referring to it Hutton's two specimens, it extends west to the Sutlej. There Hutton obtained it in separate holes, "beneath a thorny bush called 'Jhund' in the desert tracts of shifting sand between Sundah Badairah and Hasilpoor," on the left bank of the Sutlej, and apparently in close proximity to *Erinaceus pictus*.

ERINACEUS BLANFORDI, n. s., Plate V.

Muzzle rather short (fig. *d*) and not much pointed; ears moderately large (fig. *g*), but broader than long and rounded at the tips, which are not accuminate as in *E. grayi*. The length of the anterior margin is equivalent to the breadth of the ear at its base. The feet (figs. *e* and *f*) are large and the hind foot resembles that of *E. grayi*, with the first toe well developed and there is the absence of any well developed median pad. The feet are also larger and broader than in *E. jerdoni*, and the first toe is more largely developed as in *E. grayi*. The claws are long and curved, especially those of the fore foot. The tail (fig. *h*) is short. The spines meet in a point on the forehead and do not reach quite so far forwards as the base of the upper border of the ear, and there is no bare patch in the midst of them, on the vertex. They are moderately long with 24 to 28 concentric ridges and furrows, the former finely tubercular. The general colour of the spiny portion of the animal is deep black, when the spines are looked at directly on end and when they are at rest, but when raised or seen sideways, the mesial yellow band becomes visible. The apex of each spine is broadly tipped with deep black, and this is succeeded by a very broad yellow mesial band, the base of each spine being dusky brown. The fur generally is deep brown and moderately long and soft. A few white hairs occur on the chin, and there is a tuft of white hairs at the anterior angle of the ear, and the latter anteriorly and posteriorly is sparsely covered with white hairs.

The skin of the back of the ear is blackish, also the margins of the ears anteriorly, but the centre of the ear is white. The claws are yellowish.

Measurements of *E. blanfordi*.

	♂
Length of body and head,	5″36
„ of tail,	0 91
„ of hind foot without claw,	1″32
Height of ear,	1″10

Breadth of ear,	0″·85
Nose to eye,	0″·72
Eye to ear,	0″·35

The skull (figs. *a* to *c*) of this species is distinguished from that of *E. grayi*, by its much less zygomatic breadth and by the less protuberant character of the supra post-orbital region. The teeth in both these species have much the same general characters. It is undoubtedly very closely allied to *E. grayi*, which it resembles in the absence of a bare area over the vertex, in its large feet with its hind toes somewhat turned inwards, and strong and long claws, and in the almost complete absence of a mesial pad on the hind foot, but it differs from it externally in its shorter muzzle, much shorter and more rounded ears, and in its darker coloration, and smaller size.

This species is known only from one specimen procured by Mr. W. T. Blanford at Rohri in Sind, where it is apparently associated with *E. jerdoni*, and I have named the species after its discoverer.

ERINACEUS JERDONI, n. s., Plate V*A*.

Muzzle moderately long and pointed. Ears large, rounded at the tips and broad at the base. Feet large, more especially the fore feet which are broad and powerful, with strong claws. The hind feet well developed, but proportionally not so large as the fore feet. A large well developed pad on the under aspect of the hind foot. Claws strong. The tail moderately long. The spines begin on a line with the anterior margins of the ear, divided on the vertex by a large nude area as in *E. micropus* and *E. pictus*. The spines are not very thick and they are marked generally with 19 grooves and 19 ridges, the latter exceeding the breadth of the former and being very sharp, with the tubercles passing down on their sides, almost into the hollow of the furrow. The animal is black when the spines lie flat, but when they are partially erected, the white bands show, and a variegated appearance is produced. In the adult with the spines 2″·15 in length, there are two white and three dark bands. The apical band is broad and deep shining black, and it is succeeded by a white band nearly of the same breadth, which is followed by a brown band with a white band below it, and then a dusky basal band. These are the characters of two females from Karachi, but in the younger of the two, the spines are 0″·97 in length and the basal band is hardly developed. In an adolescent male from Rájanpur, which I refer to this species, there is generally only one white central band to each spine, the apical and basal bands being black. In a few, however, measuring 0″·75 in length, there are two white and three apical bands as in the type, and it is probable that in this adolescent male as it reached maturity and its spines grew, the coloration of the

type would be attained. In a still younger female from Rohri, Sind, and for the privilege of examining which I am indebted to Mr. W. T. Blanford, the spines are fine and rather soft, and the majority of them do not exceed 0″·80, but yet they have only one white band prominently developed, although the basal white band is more or less indicated.

The hair generally is dusky brown, with an intermixture of grey hairs on the head and on the chin and throat, the fur behind the latter area and on the sides of the neck being paler brown than on the limbs and on the sides. A patch of white hairs occurs at the base of the anterior angle of the ear, and the inner surface of the ear is clad with short white hairs and the apical third of the back of the organ with similar hairs. The moustaches are brown and reach behind the ear. The claws are yellow.

Measurements of *E. jerdoni*.

	Adult. ♀	Adolescent. ♂
Length of body and head, ...	7″·45	5″·85
„ of tail, ...	1″·25	0″·91
„ of hind foot without claw, ...	1″·48	1″·40
Height of ear, ...	1″·40	1″·35
Breadth of ear, ...	0″·76	0″·80

The skull of the female in its general characters is allied to the skull of *E. macracanthus*, Blanford, but is considerably less, with smaller teeth, the upper dental line of the latter measuring 1″·03 to 0″·97 in this species, which is a considerable difference in such small skulls. The skull also of *E. macracanthus* is characterised by a considerable concavity on the mesial line in the fronto-parietal area, which does not exist in this species. The skull has also a very strong resemblance to the skull of *E. niger*, but it is a relatively broader skull than the latter, which has an attenuated facial region, less post-orbital breadth and less temporal contraction, a smaller brain case, and only one internal cusp developed on the third premolar. It is distinguished from the skull of *E. blanfordi* by its more slightly elongated character, by its greater post-orbital breadth and swelling, by its relatively longer and less expanded zygomatic arch, more produced muzzle and by its teeth. It is markedly distinct from the short but especially broad skull of *E. grayi*, and it has much smaller teeth than that species.

The external features which appear to me to entitle this form to recognition as a species distinct from *E. blanfordi*, are the very prominent character of the mesial pad on the hind foot, its larger ears and the presence of a large nude area on the vertex, as in *E. micropus* and *E. pictus*, this latter character along with those already indicated separating it from *E. grayi*.

It resembles *E. niger*, in having a bare mesial area on the vertex, but is distinguished from that form by its smaller fore feet and smaller ear, and by its cranial characters as well.

There can be little doubt, however, but that *E. macracanthus*, and *E. jerdoni*, are very closely allied forms, but I believe that the characters I have indicated will be found persistent and reliable guides to enable them to be distinguished the one from the other.

This species occurs at Karachi, from whence I have received it from Mr. J. A. Murray, the Curator of the Karachi Museum, and from Rájanpur from Dr. E. Sanders. Mr. Blanford has also obtained it at Rohri, in Sind.

Description of Plates.

Plate III. Details of structure of *Erinaceus pictus*, Stoliczka. *a.* upper view of skull: *b.* side view of skull: *c.* skull seen from below: *d.* side view of head: *e.* upper and under aspects of hind foot: *f.* fore foot seen from above and from below: *g.* side view of ear: *h.* side view of tail. All drawn natural size.

Plate IV. Details of structure of *Erinaceus grayi*, Bennett. *a.* upper view of skull: *b.* side view of skull: *c.* skull seen from below: *d.* side view of head: *e.* upper and under aspects of hind foot: *f.* fore foot seen from above and from below: *g.* side view of ear: *h.* side view of tail. All drawn natural size.

Plate V. Details of structure of *Erinaceus blanfordi*, n.s. *a.* upper view of skull: *b.* side view of skull: *c.* skull seen from below: *d.* side view of head: *e.* upper and under aspects of hind foot: *f.* fore foot seen from above and from below: *g.* side view of ear: *h.* side view of tail. All drawn natural size.

Plate V*A*. Skull of *Erinaceus micropus*, Blyth. *a.* upper view: *b.* side view: *c.* skull seen from below: Natural size. *d.* teeth of upper and lower jaws enlarged 2 diameters.

Skull of *Erinaceus jerdoni*, n.s. *e.* upper view of skull: *f.* side view: *g.* skull seen from below: Natural size. *h.* teeth of upper and lower jaws enlarged 2 diameters.